Drainage and Firemain systems

Lesson topic 3.5

Enabling Objectives

1. Select the procedures necessary to control and repair damage to shipboard equipment and systems
2. Coordinate the activities of the damage control teams of the repair station
3. Select those activities which require coordination with other repair stations
4. Given a damage control scenario record damage control messages

Enabling Objectives

- Record casualties on isometric DC diagrams
- Select the capabilities and operating characteristics of damage control equipment and systems under normal and degraded conditions
- Match the following damage control systems with their purpose and locations: 1. Firemain 2. Drainage 3. Ventilation 4. Casualty power

Drainage Systems

- Drainage systems in a ship provide an effective method for removing flooding or bilge water
- drainage system consists of:
  - Suction piping
  - Pumps or eductors
  - Discharge piping

Main drainage system

- Main machinery spaces
- Single line in small ships, Forward-to-aft
- Loop system in larger ships
- Used to dewater main spaces only
- Can be crossed connected into other drainage systems

Secondary drainage system

- Drains spaces forward and aft of main spaces
- Independent with it's own piping, fittings, pumps & eductors
- Can be cross-connected to main drainage system on some ships

Plumbing and deck drains, (gravity drainage)

- Installed in compartments above the water line
- Deck drains on DC deck and below are provided with closure valves
- On ships of sufficient size plumbing & deck drains are tied into the CHT system
- Progressive flooding main problem

Magazines

- Sprinkling systems are an example of an area not directly connected to a drainage system
- Magazines located above the lowest weather deck shall:
  - Adjacent to the weather deck, drain through the bulkhead via a check valve
  - Not adjacent to the weather deck, drain overboard through a deck drain having a check valve

Magazines

- Below the weather deck are provided with fittings penetrating the bulkhead at 12” off the deck with a gate valve located outside
- Gate valve is opened, allowing the water from the magazine to flow into the handling room
- Some cases a hose must be connected between the gate valve and a hose suction on a drainage system

Valves installed in drainage systems

- Stop valves - gate, angle, globe or butterfly
- Check valves
- Scuppers or plug cock
- Remote operators
- 3 way plug cock valve
- DC classifications

Firemain system

- One of the most extensive & important of the shipboard DC systems
- Piping that receives pumped water from the sea and delivers it to fireplugs, sprinkler systems & the countermeasure washdown system
  - Supplies flushing water & auxiliary services

Firemain system

- Pumps
  - Steam, electrical motor or diesel
  - Single purpose or combined fire, bilge, drainage, and flushing
  - Reciprocating or centrifugal
- Capacity
  - 100-250 GPM small ships
  - 1000 GPM in new ship designs
  - 2000 GPM - Large ships

Firemain system, pumps

- Pressure depends on the class of ship
- Most operate at 125 PSI, 150 to 175 PSI
- Located below the water line
- Shock-proof & sound isolated
- Electric are provided with primary, alternate, and emergency power
- Water pressure is monitored by local gages, pump discharges, risers, DC central, Bridge, Repair stations and throughout the ship

Firemain system, piping

- Risers, branches, and cross connects
- Smaller branches feed off main to provide service to fire plugs and auxiliaries
  - Sizes 1 1/2 inch, 2 1/2 inch
  - Located so that any point can be reached from two or more fireplugs with 100’ of hose on larger ships, and with 50’ of hose on smaller ships

Firemain valves

- Valves may be operated:
  - Locally
  - Remote consoles
  - DC deck by miscellaneous valve hydraulic controls stations (MVHC)
  - Valves are assigned a condition of material readiness classification

Firemain Cutout valves

- Located in areas to sectionalization and isolation
- Sectionalization - Divide the firemain into the maximum number of independent sections during battle
- Individual cutout valves are installed in branch lines which provide flushing water, cooling water, sprinkling systems, and other services

System configurations

- Single Main - A single main extending fore and aft near centerline on or below the DC deck
- Horizontal Loop - Two cross-connected mains extending fore and aft on or below the DC deck
  - Separated athwartship as far as practical
  - Normally divisible into three separate loops

System configurations

- Vertical Loop - Two single mains cross-connected in a vertical or oblique plane
  - Upper main installed on the DC deck & lower main as low as practical
  - Separated vertically and athwartship as far as practicable
  - The main is cross-connected to form a series of vertical loops

System configurations

- Composite System - Two mains installed on the DC deck and separated Athwartships, forms a horizontal loop on the DC deck
  - By-pass main installed at a lower level near the center line
  - Cross connections are installed alternately between one service main and the by-pass main

Operational description

- Operated under Yoke inport & underway
  - Partial sectionalization
  - Depending on type and class of ship, two or more pumps may be required
- During GQ, system is set to Zebra
  - System sectionalized using cutout valves
  - Requires at least one pump on-line for each section

Casualty operation, ruptured line

- Close cutout valves
- Identify alternate paths
- If necessary, insert adapters and length of hose for temporary service
- Make permanent repairs as soon as possible

Classifications of firemain piping, valves, and controls

- X-Ray
  - Valves which actuate main and bilge eductors
  - Sea suction and pump discharge valves outside main machinery spaces
  - Pump discharge valves in machinery space
  - System valves which do not affect the pressure on main piping or risers
  - Valves to counter measure washdown system

Classifications of firemain piping, valves, and controls

- Circle X-Ray
  - Valves to shower and eductors in missile magazines
- Yoke
  - Valves which segregate firemain into longitudinal sections

Classifications of firemain piping, valves, and controls

- Zebra
  - Segregate firemain loop into four or more sections
  - Flushing systems
  - Cooling water to certain systems
  - Eductors in living spaces and shops

Classifications of firemain piping, valves, and controls

- William
  - Control cooling water to vital systems
  - Sea suction valves for fire pumps
  - Magazine sprinklers

Magazine sprinkler systems

- Cool the ammunition in the magazine in the event of a fire
  - DCA may recommend activation
  - CO must order activation
- Two types of systems
  - Dry (5 inch and fixed ammo)
  - Wet (Missile)

Magazine sprinkler systems

- Dry magazine sprinkler system
  - Piping between the outlet of the magazine sprinkler valve and the sprinkler heads contain no water when the system is secured
- System activation
  - Manually from remote or local manual control valve
  - Automatically from Pneumatically Released Pilot (PRP) valve

Magazine sprinkler systems

Wet magazine sprinkler systems

- Piping between the magazine sprinkler control valve and the sprinkler head is full of fresh water
- Allows instantaneous sprinkling
- Activation - same as dry system

Alarm circuits

- "F" Circuit
  - High temperature alarm, (105 degrees Fahrenheit)
  - Minimum of two per magazine or one every 250 feet
- "FH" Circuit
  - Sprinkler alarm - Goes off if space reaches 160 degrees Fahrenheit or the sprinkler system is manually set into operation
  - Dry system uses electrical contacts, (activates when it gets wet)
  - Wet system uses an impeller to sense the flow of water

Alarm circuits

- "FD" Circuit
  - Liquid level alarm, (flooding alarm)

Summary and Review

- Drainage systems
- Firemain systems
- Magazine sprinkler systems
- Alarms

Not its primary purpose!!!